

REMARKS

This Amendment is in response to the Official Action mailed on January 23, 2008. The period of time for responding with the enclosed petition for a three-month extension of time is set to expire July 23, 2008.

Claims 52, 55, 56, 60, and 66 have been amended and claims 1-51 claims were previously canceled. New claims 67-69 have been added. These amendments are supported by the originally filed specification and add no new matter. See, e.g., ¶¶ [0134], [0142], [0159]-[0164], and FIGS. 2C, 2H, 5B. Accordingly, claims 52-69 are pending before the Examiner. Reconsideration and withdrawal of the outstanding rejections are respectfully requested in view of the following remarks.

**I. 35. U.S.C. §112 Rejections**

Claims 55 and 60-66 are rejected under 35. U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Claims 55 and 60-66 have now been amended to recite that the top faces are "planar with said insulating film at edges of [the] openings, said top faces defining concavities away from [the] edges." Applicants respectfully submit that the claim amendments render the Examiner's rejections moot, thereby placing the claims in condition for allowance.

**II. 35 U.S.C. § 102 Rejections**

The Examiner has rejected claims 52-54 and 56 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,376,769 to Chung (hereinafter "Chung"). In light of the amendments to these claims, Applicants respectfully submit that the Examiner's rejections are now overcome.

The presently claimed invention now recites a plurality of discrete "etched" solid metal bumps.

*Chung* fails to teach the newly added limitation of "etched solid metal bumps". Instead, *Chung* discloses an electronic package which utilizes contacts/vias 335. *Chung* teaches that the vias of FIG. 16 (used to reject the presently-discussed claims) are made in like manner and with like materials to those described in relation to 110 and 210. (Col.18 ll.20-43.) Turning to the discussion of 110 and 210, *Chung* states, "[t]he via holes are filled with conductive material by a building-up process by plating metal into the via holes to form conductive vias 112 that substantially fill the via holes, preferably by plating the same metal as the metal foil . . . or alternatively by depositing an electrically-conductive composition such as a conductive adhesive. . . ." (Col.14 ll.46-64.) *Chung* further explains that the "conductive vias 212 may be plated-up metal or electrically-conductive adhesive. . . ." (Col.17 ll.45-55.) Thus, *Chung* only teaches the use of conductive paste or plating. Use of conductive paste does not result in "etched solid metal bumps," as recited in claim 52.

Moreover, although an etching metal layer is not required to create the claimed solid metal bump (see, e.g., ¶ [0023]), the Examiner has even acknowledged with respect to claim 57 that "Chung does not disclose the wiring circuit panel further including a second metal wherein said metal layer is an etch stop layer . . . ." (Office Action 6.) Accordingly, *Chung* also does not disclose or suggest the use of an etch stop layer, which is required for etching a solid metal bump from a tri-metal. Such factors make clear that *Chung* fails to disclose the limitation of an etched solid metal bump.

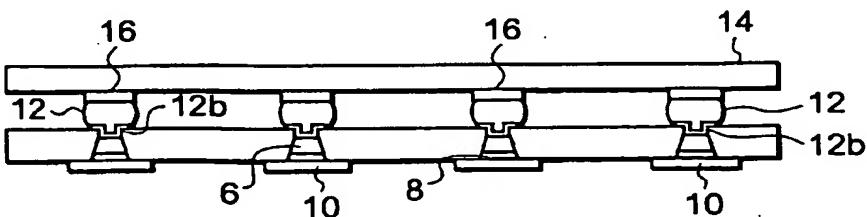
For at least the foregoing reasons, Applicants respectfully submit that the Examiner's 35 U.S.C. § 102 rejections are overcome.

### III. 35 U.S.C. § 103 Rejections

The Examiner has rejected claims 57-59 as being unpatentable over Chung, in view of Applicants' Admitted Prior Art FIGS. 13A to 13I ("APA."). Applicants respectfully submit that the Examiner's rejection is misplaced.

As shown below from FIG. 13I reproduced from APA below, the only way to connect the metal post to the solder ball 12 is by use of a base film 12b interposed between the solder ball 12 and metal post. As explained in Applicants' specification, the multilayer solder ball base film 12b is formed by plating, followed by selective etching for patterning in such a way as to separately define the solder ball base film 12b connected to each bump 6. (See, e.g., ¶ [0016].) The step of incorporating a base film 12b is an additional step that adds to the overall cost of the package.

**FIG. 13I**



Assuming that Chung and APA could be properly combined, the resulting structure would not be an obvious variant of Applicants' claimed invention. Indeed, the combination of these references would result in a structure including the base film 12b, and therefore also requiring the additional manufacturing step of plating the base film 12b over the solid metal bump 6, prior to deposition of the solder bump 12. Indeed, nothing in Chung or the APA suggests an alternative structure.

In contrast, Applicants' claimed invention eliminates this additional step by directly forming the solder ball 12 on the top face of each bump 6 exposed at the surface of the insulating film 4. (See p.33.) This saves the trouble of forming a solder ball base film 12b as a base for the solder ball. (Id.) As a result, as compared with the APA, the number of steps necessary for manufacturing the wiring circuit board can be reduced. (Id.)

With respect to claim 58, the Examiner contends that the "process limitations of wherein 'metal bumps are formed by etching a third metal layer overlying said second metal layer' do not carry weight in a claim drawn to a structure." (Office Action 6 (citation omitted).) However, etched metal bumps possess characteristics that distinguish it from a conductive via, such as disclosed by *Chung*. For example, by virtue of the etching process, metal bumps are necessarily formed from at least one layer of a multi-metal layer.

Moreover, as set forth in dependent claims 68-69, the etching process also necessarily results in a metal bump with a base that is wider than the top portion. For example, the bump is typically conical and may be substantially trapezoidal in cross section. (See, e.g., ¶ [0134].) In contrast, *Chung* only discloses that the conductive vias 112 may be about 75 micrometers in diameter. (See col.12 ll.30-32.) There is no discussion regarding vias having differing diameters.

Accordingly, Applicants respectfully submit that there are inherent structural differences associated with etched metal bumps. Thus, it is believed that the Examiner's rejection of this claim based on allegedly improperly claiming "process limitations" is overcome.

For at least these foregoing reasons, Applicants respectfully submit that *Chung*, either alone or in combination with APA, would not render claims 57-59 as obvious. Similarly,

for at least these same reasons, such arguments may be equally applicable to the remaining pending claims, such as newly added dependent claims 68-69. Accordingly, Applicants respectfully submit that the Examiner's rejection is overcome and that all of the pending claims are in condition for allowance.

#### IV. CONCLUSION

As it is believed that all of the rejections set forth in the Official Action have been fully met, favorable reconsideration and allowance are earnestly solicited. If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that the Examiner telephone Applicants' attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: July 18, 2008

Respectfully submitted,

By April M. Capati  
April M. Capati

Registration No.: 54,298  
LERNER, DAVID, LITTENBERG,  
KRUMHOLZ & MENTLIK, LLP  
600 South Avenue West  
Westfield, Previously presented  
Jersey 07090  
(908) 654-5000  
Attorney for Applicants